Curriculum Vitae
Guangjian Zhang

Personal Information

434 Corbett Family Hall   Phone: 574-631-3751
390 Corbett Family Hall (Mailing Address)   Email: gzhang3@nd.edu
Department of Psychology
University of Notre Dame
Notre Dame, IN 46556-1908

Education

Postdoctoral fellow, University of Notre Dame, 2006-2007
             Quantitative Psychology

PhD in Psychology, the Ohio State University, 2006
             Dissertation: Bootstrap procedures for dynamic factor analysis
             Advisor: Michael Browne
             Major: Quantitative Psychology
             Minor: Social Psychology

MS in Statistics, the Ohio State University, 2004

MEd in Psychology, Peking University, 1999
             Major: Counseling Psychology

BMED in Medicine, Tianjin Medical University, 1994
             Major: Clinical Medicine

Professional Positions

Associate Professor   University of Notre Dame, 2014-present
                       Department of Psychology, Quantitative Psychology

Assistant Professor   University of Notre Dame, 2007-2014
                       Department of Psychology, Quantitative Psychology

Psychiatrist   An-ding Hospital, Tianjin, China 1994-1996

Fellowships and Awards

SMEP Early-Career Award (2010). Awarded by the Society of Multivariate Experimental Psychology.

American Psychological Association Division 5 Dissertation Award (2007)

SMEP Dissertation Support Awards ($1,000), 2005

Competitive Travel Award ($500), Factor analysis at 100, 2004

Competitive Travel Award ($750), SMEP, 2003

University Fellowship, The Ohio State University, 1999, one Academic year

Department Fellowship, Psychology department at OSU, 1999, four Academic years

Guanghua Fellowship in recognition of excellent achievement in course work and research, Beijing University, 1997

Six Representative Publications

Zhang, G, & *Lee, D (Accepted). A Computationally Efficient and Robust Method to Estimate Exploratory Factor Analysis Models with Correlated Residuals. *Psychological Methods*.

Zhang, G., *Hattori, M., *Trichtinger, L (In press). Rotating factors to simplify their structural paths. *Psychometrika*. DOI: 10.1007/s11336-022-09877-3

Zhang, G., *Hattori, M., *Trichtinger, L, & *Wang, X. (2019). Target Rotation with Both Factor Loadings and Factor Correlations. *Psychological Methods*. 24, 390-402. DOI: 10.1037/met0000198

Zhang, G. (2018) Testing process factor analysis models using the parametric bootstrap. *Multivariate Behavioral Research*, 53, 219-230. DOI: 10.1080/00273171.2017.1415123

Zhang, G. (2014). Estimating standard errors in exploratory factor analysis. *Multivariate Behavioral Research*. 49, 339-353. DOI: 10.1080/00273171.2014.908271

Zhang, G., Browne, M. W., Ong, A. D., & Chow, S. (2014) Analytic standard errors for exploratory process factor analysis. *Psychometrika*. 79, 444-469. DOI: 10.1007/s11336-013-9365-x

All Publications (* designates graduate student)

*Lee, D, Zhang, G., & Luo, S. (Accepted). Circumplex Models with Multivariate Time Series: An Idiographic Approach. *Structural Equation Modeling: A Multidisciplinary Journal.*

Zhang, G, & *Lee, D (Accepted). A Computationally Efficient and Robust Method to Estimate Exploratory Factor Analysis Models with Correlated Residuals. *Psychological Methods*.

Zhang, G., *Hattori, M., *Trichtinger, L (In press). Rotating factors to simplify their structural paths*. Psychometrika*. DOI: 10.1007/s11336-022-09877-3

*Lee, D, & Zhang, G. (2022). Circumplex models with ordinal data. *Structural Equation Modeling: A Multidisciplinary Journal.* DOI: 10.1080/10705511.2022.2060231

Merluzzi, T. V., Zhang, G., Philip, E. J., *Lee, D., Balen, N, S. (2022). Discerning critical stressors and resources in the lives of cancer patients: a multivariate analysis of targets of intervention for enhancing cancer care and quality of life. Psycho-oncology, 31, 1186-1195. DOI: 10.1002/pon.5906

Zhang, G., *Trichtinger, L., *Lee, D. & Ge. J (2021) PolychoricRM: A computationally efficient R function for estimating polychoric correlations and their asymptotic covariance matrix. *Structural Equation Modeling: A Multidisciplinary Journal.* DOI: 10.1080/10705511.2021.1929996

*Trichtinger, L, & Zhang, G. (2021). Testing P-technique factor analysis with non-normal time series. *Multivariate Behavioral Research.* **DOI:10.1080/00273171.2021.1919047**

*Trichtinger, L, & Zhang, G. (2021). A bootstrap procedure for testing P-technique factor analysis. *Multivariate Behavioral Research.* **DOI:10.1080/00273171.2020.1852908**

*Trichtinger, L, & Zhang, G. (2020). Quantifying model error in P-technique factor analysis. *Multivariate Behavioral Research.* DOI: 10.1080/00273171.2020.1717414

Zhang, G., Preacher, K., *Hattori, M., *Ge, J., & *Trichtinger, L (2019). A sandwich standard error estimator for exploratory factor analysis with nonnormal data and imperfect models. *Applied Psychological Measurement,*45, 360-373. DOI : 10.1177/0146621618798669

Zhang, G., *Hattori, M., *Trichtinger, L, & *Wang, X. (2019). Target Rotation with Both Factor Loadings and Factor Correlations. *Psychological Methods*. 24, 390-402. DOI: 10.1037/met0000198

Zhang, G. (2018) Testing process factor analysis models using the parametric bootstrap. *Multivariate Behavioral Research*, 53, 219-230. DOI: 10.1080/00273171.2017.1415123

*Hattori, M., Zhang, G., & Preacher, K. (2017). Multiple local solutions and geomin rotation. *Multivariate Behavioral Research*. 52, 720-731. DOI: 10.1080/00273171.2017.1361312.

Zhang, G, & Preacher, K. (2015) Factor Rotation and Standard Errors in Exploratory Factor Analysis. Journal of Educational and Behavioral Statistics. 40, 579-603. DOI: 10.3102/1076998615606098

Zhang, G. (2014). Estimating standard errors in exploratory factor analysis. *Multivariate Behavioral Research*. 49, 339-353. DOI: 10.1080/00273171.2014.908271

Zhang, G., Browne, M. W., Ong, A. D., & Chow, S. (2014) Analytic standard errors for exploratory process factor analysis. *Psychometrika*. 79, 444-469. DOI: 10.1007/s11336-013-9365-x

Chow, S., & Zhang, G. (2013). Nonlinear regime-switching state-space (RSSS) models. *Psychometrika*, 78, 740-768.

Preacher, K. J., Zhang, G., Kim, C., & Mels, G. (2013). Choosing the optimal number of factors in exploratory factor analysis: A model selection perspective. *Multivariate Behavioral Research*, 48, 28-56.

Zhang, G., Preacher, K., & Jennrich, R. I. (2012). The Infinitesimal Jackknife with Exploratory Factor Analysis. *Psychometrika*, 77, 634-648. DOI: 10.1007/s11336-012-9281-5

*Lee, C., Zhang, G., & Edwards, M. C. (2012). Ordinary least squares estimation of parameters in exploratory factor analysis with ordinal variables. *Multivariate Behavioral Research*, 47, 314-339.

Zhang, G., & *Lee, C. (2012). Standard errors for ordinary least squares estimates of parameters in structural equation modeling. In MacCallum, R. C. & Edwards, M. C. (Ed.), *Current topics in the theory and application of latent variable models*. New York, NY: Taylor & Francis.

Chow, S., *Zu, J., Shifren, K., & Zhang, G (2011). Dynamic Factor Analysis Model with Time-Varying Parameters. *Multivariate Behavioral Research*, 46, 303-339.

Zhang, G., Chow, S., & Ong, A. (2011) A Sandwich-type Standard Error Estimator of SEM Models with Single Time Series. *Psychometrika*,76, 77-96. DOI: 10.1007/s11336-010-9189-x

Luo, S., Zhang, G., Watson, D., & Snider, A. G. (2010). Using Cross-sectional Couple Data to Disentangle the Causality between Positive Partner Perceptions and Marital Satisfaction. *Journal of Research in Personality*, 44, 665-668.

Zhang, G., & Browne, M. W. (2010) Bootstrap Standard error estimates in dynamic factor analysis. *Multivariate Behavioral Research*, 45, 453-482. DOI: 10.1080/00273171.2010.483375

Zhang, G., Preacher, K., & Luo, S. (2010). Bootstrap Confidence Intervals for Ordinary Least Squares Factor Loadings and Correlations in Exploratory Factor Analysis. *Multivariate Behavioral Research*, 45, 104-134. DOI: 10.1080/00273170903504836

Zhang, G. & Chow, S. (2010). Standard error estimation in stationary multivariate time series models using residual-based bootstrap procedures. In Newell, K. & Molenaar, P. (Eds), *Pathway to Individual Change*.

Zhang, G. & Browne, M. W. (2010). Dynamic factor analysis with ordinal variables. In Chow, S., Ferrer, E., & Hsieh, F. (Eds.), *Statistical methods for modeling human dynamics: An interdisciplinary dialogue*. Notre Dame Series on Quantitative Methodology (Vol. 4). New York, NY: Taylor & Francis.

Ferrer, E. & Zhang, G. (2009). Time series models for examining psychological processes: applications and new developments. In R. E. Millsap, & A. Madeu-Olivares (Eds.), *Handbook of Quantitative Methods in Psychology* (pp. 637-657). Sage.

Luo, S., & Zhang, G. (2009). What is attractive: Similarity, reciprocity, security or beauty? Evidence from a speed-dating study. *Journal of Personality,* 77, 933-964.

Luo, S., Chen, H., Yue, G., Zhang, G., Xu, D., & Zhaoyang, R. (2008). Predicting marital satisfaction from self, partner, and couple characteristics: Is it me, you, or us? *Journal of Personality,* 76, 1231-1266.

Chow, S., & Zhang, G. (2008) Continuous time modeling of irregularly spaced panel data using a cubic spline model. *Statistica Neerlandica*, 62, 131-154.

Browne, M. W. & Zhang, G. (2007). Developments in the Factor Analysis of Individual Time Series. In R. C. MacCallum & R. Cudeck (Eds.), *Factor Analysis at 100: Historical Developments and Future Directions* (pp. 265-291). Mahwah, NJ: Lawrence Erlbaum Associates.

Browne, M. W. & Zhang, G. (2007). Repeated Time series Models for learning data. In S. M. Boker & Wenger, M. J. (Eds), *Data Analytic Techniques for Dynamical Systems in the Social and Behavioral Sciences*. Mahwah, NJ: Lawrence Erlbaum Associates.

Zhang, G. & Browne, M. W. (2007) Design and Analysis of incomplete Multitrait-Multimethod Studies from the Multiplicative Perspective. *Psychometrika,* 72, 361-375. DOI: 10.1007/s11336-004-1224-3

Zhang, G. & Browne, M. W. (2006) Bootstrap fit testing, confidence intervals, and standard error estimation in the factor analysis of polychoric correlation matrices. *Behaviormetrika*, 33, 61-74. DOI: 10.2333/bhmk.33.61

Presentations

Zhang, G. & *Lee, D., *Li, Y. & Ong, A. (2023, October). *Integrating Dynamic Factor Analysis across Multiple Individuals.* Paper presentation, the 63nd annual meeting of the Society of Multivariate Experimental Psychology. Iowa City, Iowa.

*Lee, D., & Zhang, G. (2023, July). *Circumplex Models with Behavioral Time Series.* Oral presentation, the 88th annual meeting of the Psychometric Society, University of Maryland, MD.

Zhang, G. & *Lee, D., & (2022, October). *A Computationally Efficient and Robust Method to Estimate Exploratory Factor Analysis Models with Correlated Residuals.* Paper presentation, the 62nd annual meeting of the Society of Multivariate Experimental Psychology. Monterey, California.

*Lee, D., & Zhang, G. (2021, August). *Estimating Circumplex Models with Ordinal Data.* Poster presentation, the 129th annual convention of the American Psychological Association, Virtual Meeting.

*Lee, D., & Zhang, G. (2021, July). *Estimating Circumplex Models with Ordinal Data.* Poster presentation, the 86th annual meeting of the Psychometric Society, Virtual Meeting.

*Trichtinger, L & Zhang, G.(2020, October). *A Bootstrap Procedure for Testing P-technique Factor Analysis.* Poster presentation, the 18th SMEP student presentation, Virtual Meeting.

Zhang, G., *Trichtinger, L, *Lee, D, & Jiang, G (2020, October). *PolychoricRM: A Computationally Efficient R Function for Estimating Polychoric Correlations and Their Asymptotic Covariance Matrix.* Paper presentation, the 60th annual meeting of the Society of Multivariate Experimental Psychology, Virtual Meeting.

*Trichtinger, L & Zhang, G.(2020, July). *Testing P-technique Factor Analysis with Non-normal Time Series.* Paper presentation, the annual meeting of the Psychometric Society, Virtual Meeting.

Zhang, G. (2019, October). *Structured latent curve models and a linear approximation to nonlinear random coefficient models.* Paper presentation, the 59th annual meeting of the Society of Multivariate Experimental Psychology. Baltimore, MD.

Zhang, G., *Hattori, M., *Trichtinger, L, & *Wang, X. (2018, October). *Extending Target Rotation to Include Factor Correlations.* Paper presentation, the 58th annual meeting of the Society of Multivariate Experimental Psychology. Albuquerque, NM.

*Trichtinger, L & Zhang, G.(2018, August). *Factor Retention Methods in P-Technique Factor Analysis*. Poster presentation, the 126th annual convention of the American Psychological Association. San Francisco, CA.

*Hattori, M. & Zhang, G., * Daly E. (2018, July). *Exploratory factor analysis with sparse correlation matrices*. Paper presentation, the annual meeting of the Psychometric Society. New York, NY.

Zhang, G., *Jiang, G., *Hattori, M. & *Trichtinger, L. (2016, October). *An R package efautitilites: a collection of utility functions for exploratory factor analysis.* Paper presentation, the 56th annual meeting of the Society of Multivariate Experimental Psychology. Richmond, VA.

Zhang, G. (2015, August). *Independent component analysis with biological time series.* Paper presentation, the annual meeting of American Psychological Association. Toronto, Canada.

Zhang, G., & Li, W. (2015, July). *A comparison of dynamic factor analysis, principal component analysis, and independent component analysis with an EEG study.* Paper presentation, the annual meeting of the Psychometric Society. Beijing, China.

Zhang, G. (2014, December). *Independent Component Analysis as a Latent Variable Model: Statistical Theory and Applications*. Invited talk, McGill University. Montreal, Canada.

Zhang, G. (2014, July) *Rotating spatio-temporal models for fMRI time series*. Paper presentation, the annual meeting of the Psychometric Society. Madison, Wisconsin.

Zhang, G. (2013, July) *Stability of rotated factor loadings in exploratory factor analysis*. Paper presentation, the annual meeting of the Psychometric Society. Arnhem, the Netherlands.

Zhang, G., Ke, Z., Cain, M. & Spreng, N. (2012, July). *Identifying subsystems of the default network using dynamic factor analysis*. Poster presented at the workshop for Statistical Methods in Brain Imaging Data. San Diego, CA.

*Ke, Z., & Zhang, G. (2012, July) *Standard errors for parameter estimates of dynamic factor analysis with non-normal data*. Paper presentation, the annual meeting of the Psychometric Society. Lincoln, NE.

Zhang, G. (2011, October). *A comparison of four methods estimating standard errors in exploratory factor analysis*. Invited talk, the 51st meeting of SMEP. Norman, Oklahoma.

Preacher, K. J., Zhang, G., Kim, C., & Mels, G. (2011, October). *Selecting the number of factors in exploratory factor analysis: different indices for different goals.* Paper Presentation, the 51st meeting of SMEP. Norman, Oklahoma.

Browne, M. W., & Zhang, G. (2011, October). *Rotation to Higher Order Invariance in Dynamic Factor Analysis.* Paper Presentation, the 51st meeting of SMEP. Norman, Oklahoma.

Zhang, G., Preacher, K. J. & Jennrich, R. I. (2011, July). *The infinitesimal jackknife with exploratory factor analysis.* Paper presentation, the annual meeting of the Psychometric Society. Hong Kong, China.

Browne, M. W. & Zhang, G. (2011, July). *Rotation to higher order invariance in dynamic factor analysis*. Paper presentation, the annual meeting of the Psychometric Society. Hong Kong, China.

Zhang, G. & *Lee, C. (2011, March). *Exploratory factor analysis with ordinal variables.* Invited talk, University of Kansas. Lawrence, Kansas.

Zhang, G. & *Lee, C. (2010, September). *Applications of an Analytic Standard Error Estimator in Latent Variable Models*. Invited talk, Conference to honor the scientific contributions of Michael W. Browne. Columbus, Ohio.

*Lee, C., Zhang, G. & Edwards, M. (2010, July). *Standard error of exploratory factor analysis with ordinal variables*. Paper presentation, the annual meeting of the Psychometric Society. Athens, GA.

Zhang, G. & Preacher, K. (2010, March). *Nonparametric standard error estimation for obliquely rotated factor loadings and factor correlations in exploratory factor analysis*. Invited talk, the Ohio State University. Columbus, Ohio.

Browne, M. W. & Zhang.G. (2009, July). Capabilities of DyFA: a computer program for dynamic factor analysis. Paper presentation, the annual meeting of the Psychometric Society. Cambridge, UK.

Zhang, G. (2008, September). *The Bootstrap of stationary multivariate time series.* Invited talk, 2008 meeting on pathway of individual change. Pennsylvania.

Zhang, G., Ong, A. D., & Bergeman, C. S. (2008, July). A sandwich-type standard error estimator for vector autoregressive moving average models. Paper presentation, the annual meeting of the Psychometric Society. Durham, New Hampshire.

Zhang, G. (2007, August). *New developments in dynamic factor analysis*. Invited talk, the annual meeting of the American Psychological Association. San Francisco, California.

Zhang , G. (2007, July). *Comparing dynamic factor models using the bootstrap*. Paper presentation, the annual meeting of the Psychometric Society. Tokyo, Japan.

Zhang , G. (2007, May). Dynamic factor analysis in psychological research. Invited talk, Notre Dame Series on Quantitative Methodologies (NDSQM). Notre Dame, Indiana.

Zhang, G., & Browne, M. W (2006, June). *Dynamic Factor Analysis of Polychoric Autocorrelation Matrices*. Paper presentation, the annual meeting of the Psychometric Society. Montreal, Canada.

Browne, M. W, & Zhang, G. (2006, June). *Rotation in Dynamic Factor Analysis*. Paper presentation, the annual meeting of the Psychometric Society. Montreal, Canada.

Browne, M. W., & Zhang, G. (2004, October). *DyFA: A computer program for the factor analysis of individual time series*. Paper presentation, the annual SMEP conference. Fort Myers, FL.

Zhang, G. (2004, June). *Bootstrapping dynamic factor analysis*. Paper presentation, the annual meeting of the Psychometric Society. Monterey, CA.

Browne, M. W., & Zhang, G. (2004, June). *Exploratory factor analysis of lagged correlation matrices*. Paper presentation, the annual meeting of the Psychometric Society. Monterey, CA.

Browne, M.W., & Zhang, G. (2004, May). *Developments in the factor analysis of single time series.* Invited talk, the Factor Analysis at 100 Conference. Chapel Hill, NC.

Zhang, G. (2003, September). *Bootstrapping multivariate time series analysis*. Paper Presentation, the 1st SMEP graduate student preconference. Keystone, CO.

Browne, M.W., & Zhang, G. (2003, September). *Fitting the factor analysis model to lagged correlation matrices: the P-technique*. Paper presentation, the annual SMEP conference. Keystone, CO.

Browne, M. W., & Zhang, G. (2002, October). *Estimation of the direct product model with incomplete Multitrait-multimethod data.* Paper Presentation, the annual SMEP conference. Charlottesville, VA.

Software

Zhang, G., Jiang, G., Hattori, M. & Trichtinger, L. (2019, February). *EFAutitilites: An R package for Exploratory Factor Analysis.* Computer software, available from the CRAN.

Courses Taught

Undergraduate level: Introduction to Statistics, Introduction to Quantitative Neuroscience

Graduate level: Time Series Analysis, Multivariate Analysis, Theoretical Foundations of Factor Analysis, and Statistical Inference.

Grants and Sponsored Programs (indicate your role)

An Intensive Longitudinal Study of Chinese Physicians' Wellness. The Science of Wellness Initiative at University of Notre Dame. Role: PI. 2019-2020. (Unfunded). Requested amount: $ 84,799.

An Ecological Momentary Assessment Study on Burnout among Chinese Physicians. NDI, Asian Research Collaboration Grant. Role: PI. 2019-2020. (Unfunded). Requested amount: $10,099.

Dynamic analysis of self-management of patients with type-2 diabetes. Advanced Diagnostics and Therapeutics. Role: PI. July 2017-July 2018. $42, 284.

Application of the Dual-Component Theory to Adaptive Working Memory Training. Role: Statistical Consulant. PI: Bradley Gibson. IES (2015-2018).

Connectivity analysis with resting-state fMRI time series, Institute for Scholarship in the Liberal Arts (ISLA), University of Notre Dame. Role: PI. May 2013 – January 2014. $15,000.

Introduction to Quantitative Neuroscience. A course development grant, Institute for Scholarship in the Liberal Arts (ISLA), University of Notre Dame. Role: PI. May 2013 – December 2013. $3,500.

Development and evaluation of a novel working memory intervention for ADHD. Role: Consultant. PI: Bradley Gibson. NIH. R21 (Unfunded).

Application of the dual-component model to adaptive working memory training. Role: Consultant. PI: Bradley Gibson. NIH. R01 (Unfunded).

Development of an adaptive training intervention that targets the secondary memory component of working memory. Role: Consultant. PI: Bradley Gibson & . IES. (Unfunded).

Novel Methods for analyzing daily diary data. Role: PI. National Institute of Aging. R21, (unfunded).

Immune Dysregulation by Psychological Distress. Role: Co-Investigator. PI: Herbert Mathews & Linda Janusek. National Cancer Institute. R01 (Unfunded).

University Committee Activities

2023	Member, Clinical Search Committee
2021-present	Director of the quantitative psychology area
2021-2022	Member, Clinical Search Committee
2018-present	Member, Strategic hiring committees
2018-2021	Member, IRB
2017-2020	Member, Advanced Diagnostics and Therapeutics Steering Committee
2018-2019	Member, the Task Force of Clinical & Translational Opportunities Assessment, Science of Wellness Initiative
2018-2020	Member, Appointment and Promotion Committee
2017-2019	Member, Neuroscience and Behavior Steering Committee
2015-2018	Member, Faculty Senate of University of Notre Dame
2017	Member, Cognitive Search Committee
2016	Member, Quantitative Search Committee
2012-2015	Member, Communication and Website Committee
2012-2013	Member, Communications, Awards & Website Committee
2009-2012	Member, Library Development Committee
2008-2009	Member, Space Committee
2007-2008	Member, Colloquium Committee

Statistical Consulting Experiences

Statistical Consultant, Spring 2004 to Spring 2005. Advised topics include factor analysis, structural equation modeling, random coefficient models, structured latent curve analysis, regression and correlation, ANOVA, nonparametric analysis, graphing techniques, and data manipulation. In addition to data analysis, I also helped my clients with their research design, proposal writing, and manuscript revision.

Professional Affiliation

Society of Multivariate Experimental Psychology
Psychometric Society
American Psychological Association Division 5: Evaluation, Measurement, and Statistics
Association for Psychological Science

Professional Services

Editorial Board, Psychological Methods, Multivariate Behavioral Research, Journal of Personality

Associate Editor, Behaviormetrika

Ad-hoc Reviewer, Multivariate Behavioral Research, Psychometrika, Psychological Methods, Behavior Genetics, The Journal of Early Adolescence, Journal of Multivariate Analysis, Computational Statistics, Applied Psychological Measurement, Nursing Research.

Reviewer, proposals for the 2013, 2014 meeting of APA division 5

Reader, Society of Multivariate Experimental Psychology student conference, 2004